THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

STUDENTS' ITEMS RESPONSE ANALYSIS REPORT FOR THE FORM TWO NATIONAL ASSESSMENT (FTNA) 2017

033 BIOLOGY

THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

STUDENTS' ITEMS RESPONSE ANALYSIS REPORT FOR THE FORM TWO NATIONAL ASSESSMENT (FTNA) 2017

033 BIOLOGY

Published by
The National Examinations Council of Tanzania,
P.O. Box 2624,
Dar es Salaam, Tanzania.

TABLE OF CONTENTS

FOREWORD

The Form Two National Assessment (FTNA) is a two years formative assessment in secondary education which, among other things, assesses knowledge and skills acquired by students in their two years of secondary education. The feedback will enable the educational administrators, school managers, teachers and students to identify appropriate measures to take in order to improve the students' acquisition of knowledge and skills, hence a good performance in future assessment administered by the Council.

The analysis highlights factors which contributed to students' poor performance in some questions. The factors include the lack of or insufficient content knowledge, failure to recognize the demand of the questions, poor essay writing skills and low proficiency in the English language.

The National Examinations Council of Tanzania will highly appreciate useful comments and suggestions from teachers, students and other educational stakeholders on how to improve future students' Items Response Analysis Reports.

Finally, the Council would like to thank the examination officers, subject teachers and all who participated in the preparation of this report.

Dr. Charles E. Msonde
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report is an analysis of responses by the students who sat for the Biology Form Two National Assessment (FTNA) in November 2017. The assessment was set according to NECTA format issued in 2017. It was composed of questions intended to assess students' biological competences after covering Form One and Form Two Biology syllabus of 2010.

The paper consisted of eleven questions in sections A, B and C. Section A was comprised of four (4) Multiple Choice questions, True and False, Matching and Completion of the statement items. In section A, question number one (1) and two (2) carried ten (10) marks each. Question three (3) and four (4) carried five (5) marks each. Section B had five (5) short answer questions which carried ten (10) marks each. Section C had two (2) essay type questions which carried twenty (20) marks each. However a student had to opt for only one (1) question.

Data analysis shows that 521,069 students registered for FTNA in 2017. Out of the registered students, 485,565 sat for Biology paper, of which 257,652 (53.16%) passed and 227,913 (46.84%) failed. There is a decrease by 9.93 % in comparison to FTNA 2016, where 257,698 (63.09 %) passed.

The report begins by explaining what the questions required from students and proceeds with analysis of the students' performance. The performance of students in each question is categorized as good, average or weak if the percentage of the students who scored 30 percent and above lies in the range of 65 to 100, 30 to 64 and 0 to 29 respectively. Moreover, the report highlights possible causes of the performance observed and suggests probable reasons for such a particular performance. Additionally, samples of students' answers were inserted as extracts to exhibit good and poor responses. Charts and graphs are also used to illustrate students' performance in each question. The report ends with a conclusion and recommendations. In due regard, it is expected that teachers, students and educational stake holders, will take advantage of the report findings to identify areas of weakness and in so doing use the information to improve the teaching and learning of Biology subject in schools.

2.0 ANALYSIS OF THE STUDENTS PERFORMANCE PER QUESTION

2.1 Section A: Objective Questions

This section was composed of four questions categorized into multiple choices, True and False, matching and completion of statements items. All questions in this section were compulsory.

2.1.1 Question 1: Multiple Choice Items

The question consisted of ten multiple choice items, carrying a total of ten (10) marks. For each of the items (i) to (x), the students were asked to choose a correct answer from the four given alternatives. The question items were drawn from eight topics namely: Classification of Living Things, Balance of Nature, Transport of Materials in Living Things, Nutrition, Gaseous Exchange and Respiration, Cell Structure and Organization, Health and Immunity and Safety in Our environment.

The analysis of the students' performance shows that the majority (69.99%) of the students scored from 3 to 6 marks out of 10 marks allocated to this question. The students who scored from 7 to 10 marks were 16.37 percent and 13.64 percent scored from 0 to 2 marks. Data show that the performance in this question was good. Figure 1 summarizes the performance.

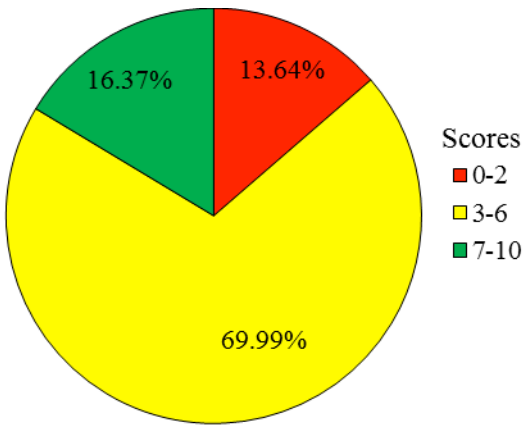


Figure 1: *The summary of the students' performance in question 1.*

Figure 1 shows that the students' performance in this question was good since more than three quarters (86.36%) scored 30 percent or more of the ten marks allocated to this question. Despite this good performance, further

analysis reveals that most of the students who did not score full marks allotted to this question faced difficulty in answering item (vii) and (viii). In item (vii) students were required to identify a blood vessel which carries blood from the lungs to the heart. The correct answer was alternative *C, pulmonary vein*. However most of the students selected alternative *A, pulmonary artery*. These students failed to recognise that all arteries except pulmonary artery carry blood toward the heart, while all vein except pulmonary veins carry blood away from the heart. This shows a partial knowledge of the topic of Transport of Materials in living things specifically the role of each blood vessel among students.

In item (viii) the students were required to identify a list of animals' tissues. The correct answer for this item was alternative *A, Muscle, blood and bone*, but the majority of the students selected alternative *D, Muscle, liver and skin* while others chose C, *skin, heart and brain*. The students failed to recognise that liver, skin, heart and brain are organs. This is an indicator that they lacked clear understanding of a concept of cell differentiation taught under the topic of cell structure and organization.

2.1.2 Question 2: True and False Items

The question consisted of ten statements drawn from eight topics namely: Introduction to Biology, Gaseous Exchange and Respiration, Nutrition Transport of Materials in Living Things, Safety in Our Environment, Balance of Nature, Health and Immunity and Classification of Living Things. The students were required to write TRUE for a correct statement and FALSE for an incorrect statement.

Data reveal that 67.61 percent of the students scored from 3 to 6 marks. The students who scored from 7 to 10 marks were 28.07 percent and 4.32 percent scored from 0 to 2 marks out of the 10 marks allocated to this question. These data signify that the students' performance in this question was good since 95.68 percent scored 30 percent or more of the marks allocated to the question. Figure 2.1 gives a summary of the performance in the question.

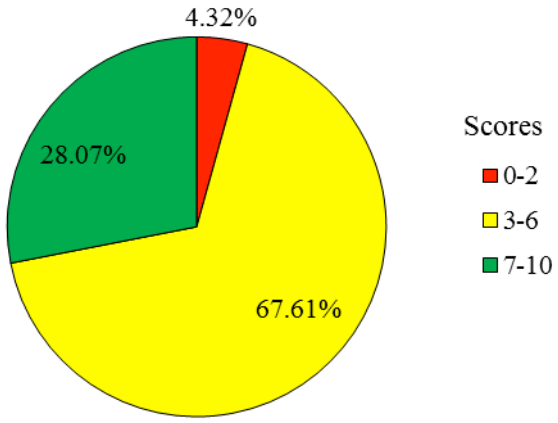


Figure 2: *The summary of the students' performance in question 2.*

The students who performed well in this question comprehended all or most of the biological concepts tested under the question. Thus, they were able to identify correct and incorrect statements accordingly. Extract 2.1 is a sample of student's good response.

Extract 2.1

2. For each of the items (i) - (x), write **TRUE** if a statement is correct or **FALSE** if a statement is not correct in a space provided.

(i) Botany is the study of animals.....False.....

(ii) Gaseous exchange in mammals takes place in the nose and mouth.....False.....

(iii) One enzyme can act on several food substances.....False.....

(iv) During inhalation the ribs move upwards and outwards.....True.....

(v) Anemia is a condition in which the patient has few erythrocytes.....True.....

(vi) Landfill is a way of disposing domestic wastes.....True.....

(vii) Amylase is an enzyme which acts on protein.....False.....

(viii) A consumer in ecosystem produces their own food.....False.....

(ix) Syphilis is a communicable disease.....True.....

(x) All bacteria are harmful to man.....False.....

Extract 2.1 shows that, the student had sufficient knowledge of the topic tested as she/he managed to recognize the correct and incorrect statements.

On the other hand, most of the lower achievers failed in items (iii) and (x). Item (iii) stated that, *One enzyme can act on several food substances.* The

correct answer was *False.* In this item students failed to understand that enzymes are specific in their actions. They act on one food substance only.

Item (x) stated that, *All bacteria are harmful to man*. The correct answer was *False.* In this item students failed to recognise that while some bacteria are harmful like those which cause diseases others are advantageous as they are used in industries to make medicine, gene cloning etc. The responses show that the students had inadequate knowledge of the advantages and disadvantages of bacteria. Extract 2.2 shows a sample of a student's poor response.

Extract 2.2

For each of the items (i) - (x), write **TRUE** if a statement is correct or **FALSE** if a statement is not correct in a space provided.

(i) Botany is the study of animals.....TRUE.....

(ii) Gaseous exchange in mammals takes place in the nose and mouth....TRUE.....

(iii) One enzyme can act on several food substances.....TRUE.....

(iv) During inhalation the ribs move upwards and outwards....FALSE.....

(v) Anemia is a condition in which the patient has few erythrocytes.....FALSE.....

(vi) Landfill is a way of disposing domestic wastes.....FALSE.....

(vii) Amylase is an enzyme which acts on protein.....TRUE.....

(viii) A consumer in ecosystem produces their own food.....TRUE.....

(ix) Syphilis is a communicable disease.....FALSE.....

(x) All bacteria are harmful to man.....TRUE.....

Extract 2.2 depicts responses from a student who failed to correctly respond in all items. These responses show that the student lacked content knowledge about the topics tested.

2.1.3 Question 3: Health and Immunity

This question consisted of five matching items derived from a topic of Health and Immunity. In this question, the students were required to match biological phrases given in list A with responses in list B by writing the

letter of the correct responses from list B against the item number in the table provided. The items were:

List A		List B
(i)	A disease transmitted through sexual intercourse and treated by antibiotics.	A Cholera B Typhoid
(ii)	A viral disease transmitted through sexual intercourse.	C AIDS D Malaria
(iii)	A disease characterized by fever and coughing up blood sputum.	E Syphilis F Common cold
(iv)	A disease spread by an agent known as anopheles.	G Schistosoma H Tuberculosis
(v)	A disease caused by lack of proper hygiene and victim had a stool of rice-water colouration.	

The analysis shows that 30.14 percent scored from 4 to 5 out of 5 marks allocated to this question. The students who scored from 2 to 3 marks were 41.14 percent and 28.72 percent of the students scored from 0 to 1 mark out of which 9.38% failed by scoring 0 marks. Figure 3 summarizes the performance in the question.

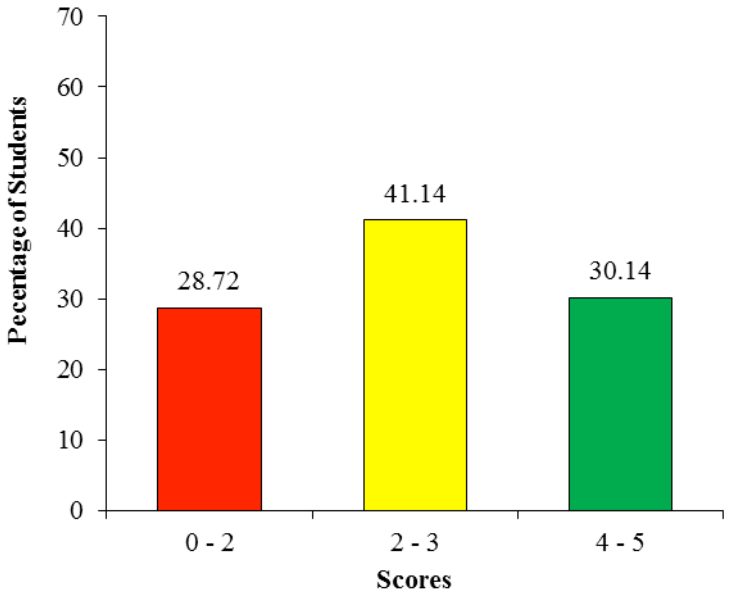


Figure 3: *The students' performance in question 3.*

The trend in Figure 3 shows that students' performance in the question was good as the majority (71.28%) scored 30 percent or more of the marks allotted to the question. The students who performed well in this question had sufficient knowledge of the topic of Health and Immunity. However, some of them failed to comprehend some of the concepts about Health and Immunity. Extract 3.1 shows a sample of a student's good response.

Extract 3.1

ANSWER

List A	(i)	(ii)	(iii)	(iv)	(v)
List B	E	C	H	D	A

Extract 3.1 is a sample of response from a student who answered the questions correctly.

Further observation from students' responses indicated that most of the students who scored lower marks failed mostly in item (i) and (iii). In item (i), students were required to select a response which correctly matches with a description of a disease transmitted through sexual intercourse and treated by antibiotics. Most of the student selected the option *C, AIDS* instead of *D, Syphilis* which is the correct answer. These students failed to recognise that even though syphilis and AIDS are sexually transmitted diseases syphilis can be treated by antibiotics whereas AIDS has no treatment.

Similarly, in item (iii), the students were required to select a response which correctly matches with a description of a disease characterized by fever and coughing up blood sputum. Although the correct answer was the alternative *H, Tuberculosis*, most of the students selected the alternative *D, Malaria*. These students did not understand that even though fever is a diagnostic symptom for both diseases, Tuberculosis has unique symptom which is coughing up blood sputum. These responses signify that the students failed to distinguish between the symptoms of Malaria and Tuberculosis. Extract 3.2 shows a sample of a student's poor response.

Extract 3.2
ANSWER

List A	(i)	(ii)	(iii)	(iv)	(v)
List B	B	A	F	C	B

Extract 3.2 is a sample of response from a student who failed to answer the question correctly.

2.1.4 Question 4: Classification of Living Things

In this question students were required to complete a statement by writing a correct answer in a space provided in each item. The question consisted of five items drawn from a topic of Classification of Living Things and had a total of five (5) marks.

The data show that more than half (60.54%) of the students who did this question scored from 0 to 1 mark and 26.98 percent scored from 2 to 3 marks. The students who scored from 4 to 5 marks were 12.47 percent. A few (0.01%) of the registered students for this assessment did not attempt the question. Figure 4 presents the performance in question 4.

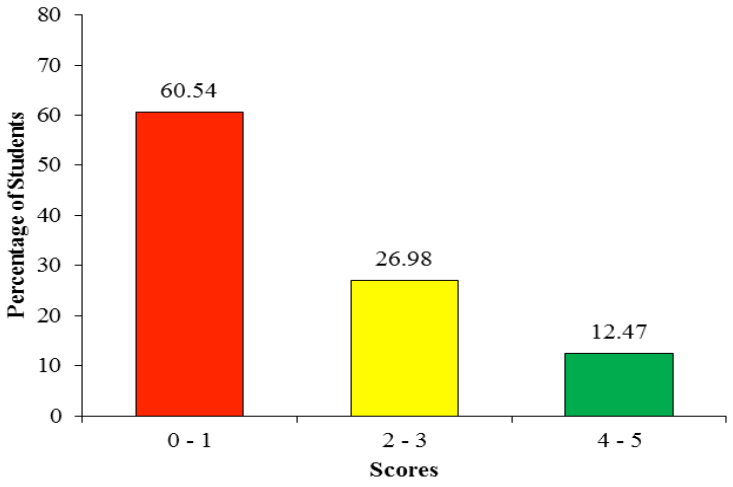


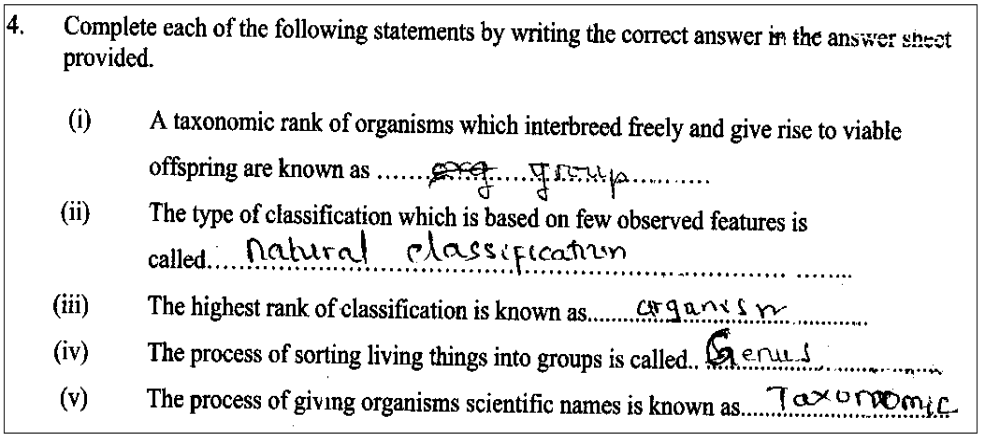
Figure 4: *The students' performance in question 4.*

Figure 4 shows that the students' performance in this question was average. However more than a half (60.54%) of the students scored low marks. It was observed that most of the students who scored low marks lacked

knowledge about classification ranks. For example in (iii), some students wrote responses such as *angiospermophyta, arthropoda and insecta* instead of Kingdom. In (ii), some students failed to recognise the type of classification system which has a few observable features. They wrote *natural classification system* instead of *artificial classification system*. Others interpreted the types of classification system which have few observable features as merits and demerits of classification system. Thus, they wrote *it needs expertise to group organism* and *it does not need expertise*.

All these responses imply that the students had inadequate knowledge of the topic of Classification of Living Things. Extract 4.1 is a sample of a student's poor response.

Extract 4.1



4. Complete each of the following statements by writing the correct answer in the answer sheet provided.

(i) A taxonomic rank of organisms which interbreed freely and give rise to viable offspring are known as ..... group .....

(ii) The type of classification which is based on few observed features is called..... Natural classification .....

(iii) The highest rank of classification is known as..... organism .....

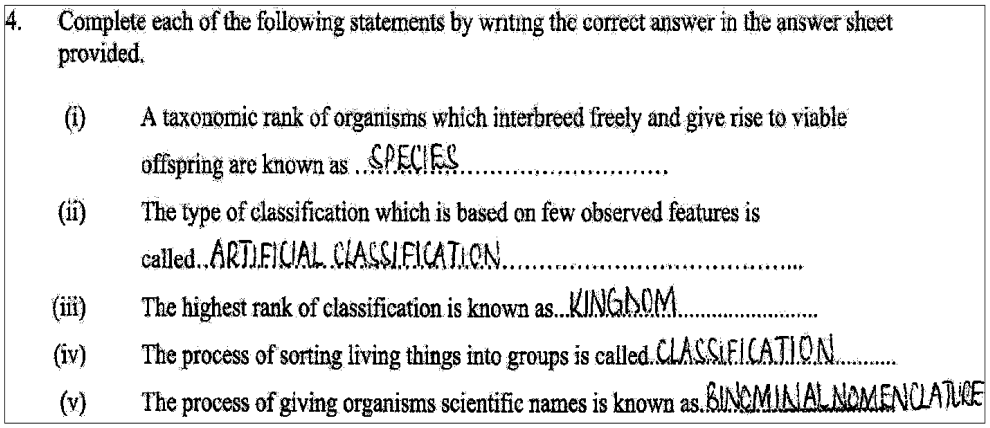
(iv) The process of sorting living things into groups is called.. Genus .....

(v) The process of giving organisms scientific names is known as..... Taxonomic

The extract 4.1 shows a sample of a student who demonstrated inadequate knowledge on the concept of Classification. For example, he/she wrote *natural classification* instead of *artificial classification* which is based on few observable features.

Despite the average performance of students in this question, there were few of the students who performed well. These students provided correct answers, signifying that they were knowledgeable enough of the topic of Classification of Living Things. Extract 4.2 is a sample of a student's good responses.

Extract 4.2


4. Complete each of the following statements by writing the correct answer in the answer sheet provided.

(i) A taxonomic rank of organisms which interbreed freely and give rise to viable offspring are known as ...SPECIES.....

(ii) The type of classification which is based on few observed features is called...ARTIFICIAL CLASSIFICATION.....

(iii) The highest rank of classification is known as...KINGDOM.....

(iv) The process of sorting living things into groups is called.CLASSIFICATION.....

(v) The process of giving organisms scientific names is known as.BINOMINAL NOMENCLATURE

Extract 4.2 shows responses of a student who managed to provide correct answers an indicator that he/she was knowledgeable in the concept tested under the topic of Classification of Living Things.

2.2 Section B: Short Answer Question.

This section composed of five (5) compulsory short answer questions each carrying 10 marks.

2.2.1 Question 5: Introduction to Biology

The question had two parts (a) and (b). In part (a) students were required to outline seven steps of scientific process used by scientists in a scientific investigation. In part (b) students were required to explain why a hand lens is useful in studying Biology.

Data analysis reveals that 54.59 percent of the students scored from 0 to 2 marks. Moreover 24.6 percent scored from 3 to 6 and 20.81 percent scored from 6.5 to 10 of the total marks allocated to this question. Figure 5 summarizes the performance.

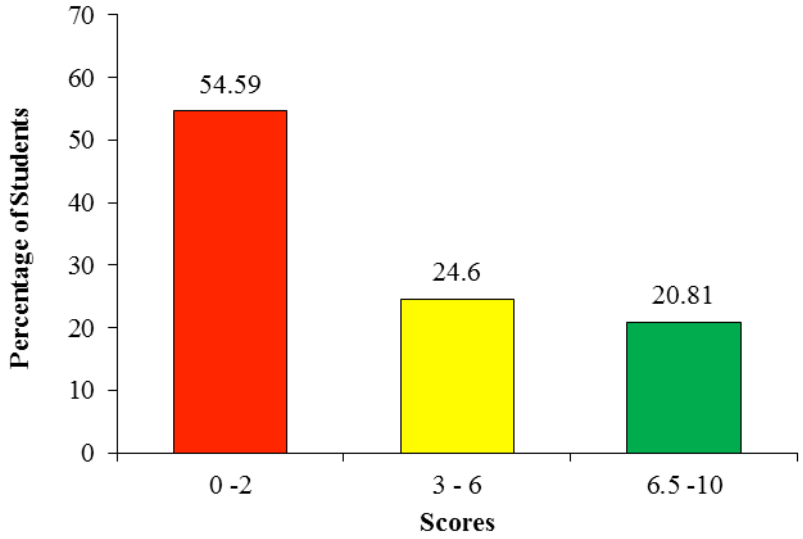


Figure 5: *The students' performance in question 5.*

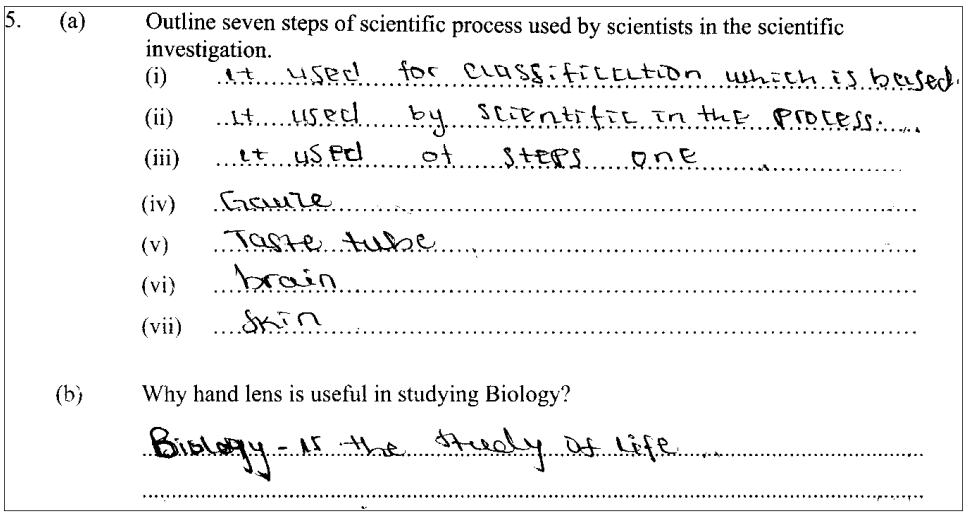
Figure 5 shows that the students' performance in this question was average. However 54.59 percent of the students scored low marks. The students who scored low marks in part (a) could not state steps of scientific processes correctly. Some of them wrote the characteristics of living things such as *nutrition, movement and death*. Others listed the taxonomic hierarchies such as *family, order and species*. These responses indicate that the students did not understand the demand of the question. Some of the students copied sentences from the question paper to fill the gaps instead of writing the steps used in a scientific investigation.

Similarly, in part (b) some of the students were not able to correctly respond to why the hand lens is useful in studying Biology. Most of them wrote the importance of studying Biology as *It helps to understand our life better, it helps to understand environment better, It help to understand of scientific process, It help to understand the laboratory rules.* Others correctly defined the term Biology *as the branch of science which deals with the study of life and living things, for example plant and animals. Others incorrectly defined Biology as the study of life of animals and plants.* These responses show that the students failed to understand the question demand or they rushed to attempt the question without reading it carefully.

Although some students had an idea of using hand lens in Biology, they failed to express themselves in English. They wrote unclear sentences as *because use hand lens check in organism small and experiment in the*

laboratory; use to check the insect, used to see in sciences. Others failed to understand the demand of the question as in part (a) they mentioned body organs such as skin instead of the steps of a scientific processes. Extract 5.1 exhibits one of the cases.

Extract 5.1


5. (a) Outline seven steps of scientific process used by scientists in the scientific investigation.

(i) it used for classification which is based

(ii) it used by scientific in the proess

(iii) it used of steps one

(iv) Cause

(v) Taste tube

(vi) brain

(vii) skin

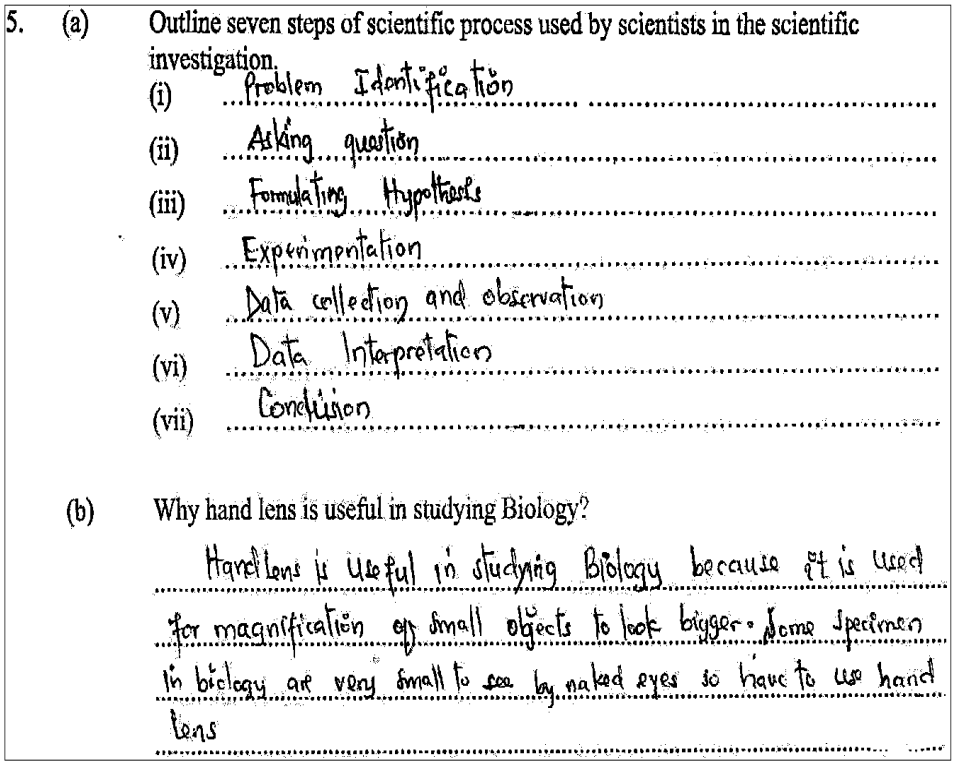
(b) Why hand lens is useful in studying Biology?

Biology - is the study of life

Extract 5.1 shows a sample of responses from a student who outlined apparatus such as taste tube instead of scientific processes.

Despite the average performance of students in this question, a few of the students gave correct responses in almost all parts of the question. The students who performed well in part (a) outlined seven steps of scientific process and in part (b) correctly explained why a hand lens is useful in studying biology. These responses show that they had an adequate knowledge of the concepts taught in a topic of Introduction to Biology. Extract 5.2 is a sample of a student's good response.

Extract 5.2


5. (a) Outline seven steps of scientific process used by scientists in the scientific investigation.

(i) Problem Identification

(ii) Asking question

(iii) Formulating Hypotheses

(iv) Experimentation

(v) Data collection and observation

(vi) Data Interpretation

(vii) Conclusion

(b) Why hand lens is useful in studying Biology?

Hand lens is useful in studying Biology because it is used for magnification of small objects to look bigger. Some specimen in biology are very small to see by naked eyes so have to use hand lens

Extract 5.2 is a sample of responses from a student who correctly outlined seven steps of the scientific process and gave a clear explanation of the usefulness of a hand lens in studying Biology.

2.2.2 Question 6: Balance of Nature

In part (a) the students were required to give definitions of (i) parasite (ii) host and (iii) community, while in part (b), they were required to provide two examples of each of (i) Endoparasite and (ii) Ectoparasite.

Data indicate that 86.78 percent of the students scored from 0 to 2 marks, out of which 67.15 percent scored a 0 mark. The students who scored 3 to 6 marks were 10.32 percent, whereas a few (2.89%) scored from 7 to 10 marks as shown in Figure 6.

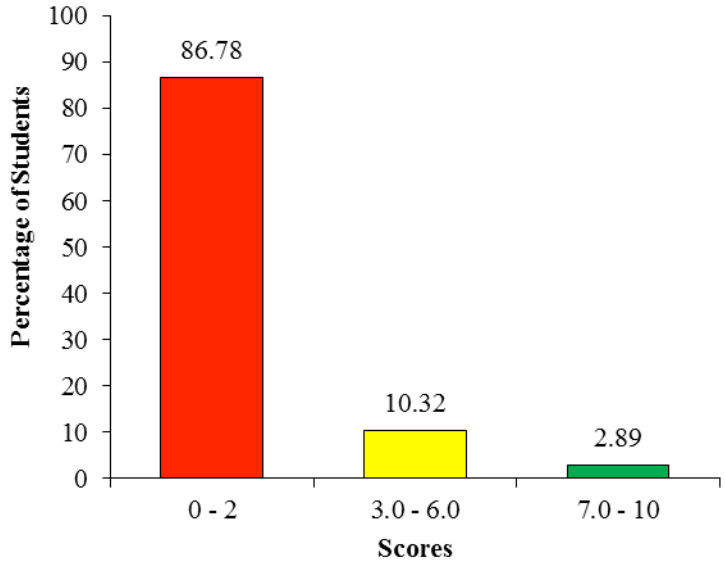


Figure 6: *The student's performance in question 6.*

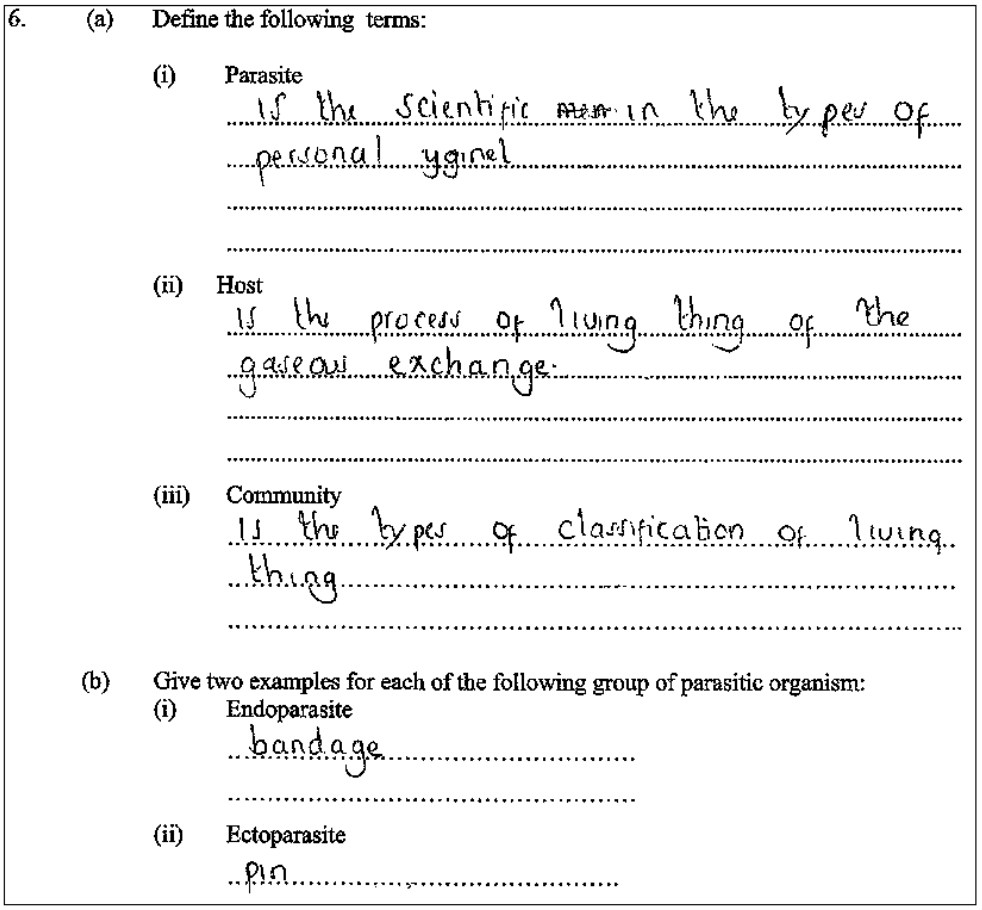
With reference to Figure 6, the students' performance in this question was weak. That is the majority (86.78%) of the students scored low (0 - 2) marks. It was observed that in part (a) most of the students were not able to correctly give the definition of parasite, host and community. Some of the incorrect definitions given for parasite are *an agent which causes diseases and living in the hosts, a disease causing organism, a parasite is an insect which live in the host.* In addition, some of the students wrote parasite *is a plasmodium living in female anopheles mosquito and Trypanosoma living in tsetse fly.*

In part (b), most of the students' responses on the examples of ectoparasite and endoparasite were interchanged. Responses such as *lice, bed bug and leech* were given as the examples of endoparasite while *ascaris, liver fluke and tape worm* as the examples of ectoparasites. On the other hand, some students named various parts of the body such as *eyes, heart, alimentary canal* and others wrote the components of First Aid Kit such as *bandage* and *pin* instead of giving examples of endoparasite and ectoparasite. These responses imply that the students lacked knowledge of the concepts taught under a topic of Balance of Nature Extract 6.1 illustrates a sample of student's poor response.

This equally implies that the method used to teach these concepts did not enable the students to well understand the interaction among living organisms in the ecosystem. In short, students need field studies to different

habitats near the school to get better understanding of the concepts. Field study enables them to observe the interaction among living organisms and help them to do some investigations.

Extract 6.1


6. (a) Define the following terms:

(i) Parasite

is the scientific ~~mea~~ in the byes of personal ygine

(ii) Host

is the proces of living thing of the gaseas exchange.

(iii) Community

is the byes of clasrification of living thing

(b) Give two examples for each of the following group of parasitic organism:

(i) Endoparasite

bandage

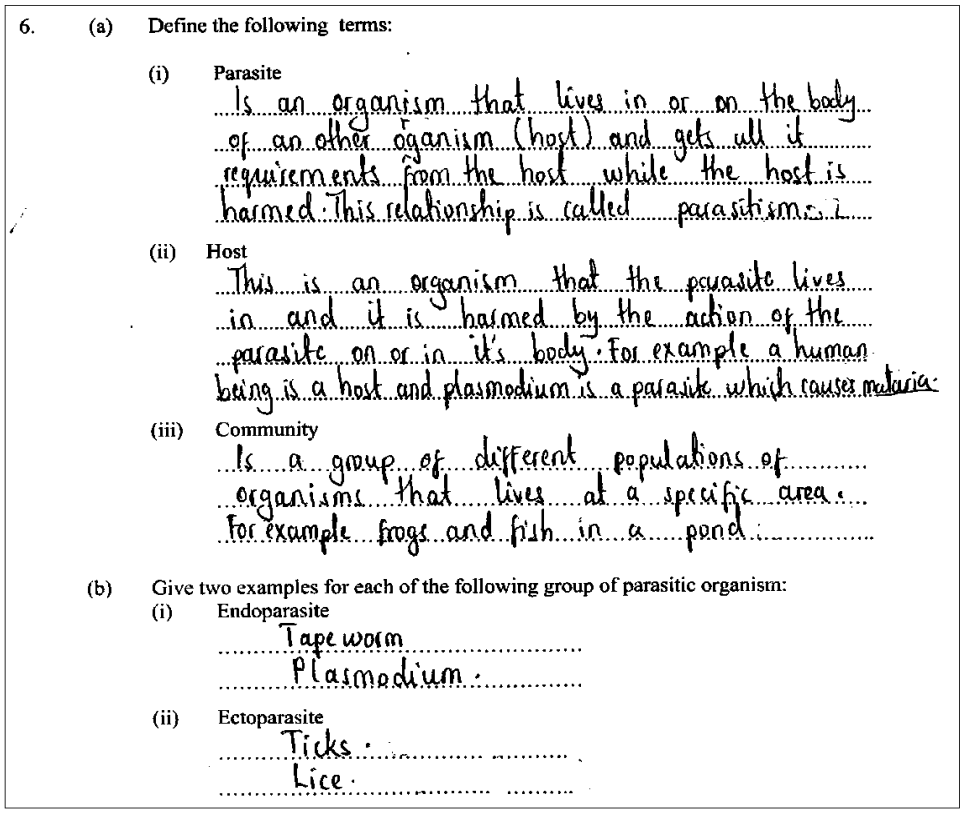
(ii) Ectoparasite

pin

Extract 6.1 indicates an incorrect response from a student who wrote irrelevant concepts which relate to the topic of Classification in (a) (iii) and gave examples of the components of First Aid Kit in (b) (i) and (ii) instead of basing on the topic of Balance of Nature.

Despite the weak performance, a few of the students performed the question very well. These students correctly gave clear definitions of the terms parasite, host and community. They also correctly gave examples of endoparasite and ectoparasite, which implies that they had an adequate knowledge of the topic of Balance of Nature. Extract 6.2 is a sample of a student's good response.

Extract 6.2



6. (a) Define the following terms:

(i) Parasite

Is an organism that lives in or on the body of an other oganism (host) and gets all it requirements from the host while the host is harmed. This relationship is called parasitism.

(ii) Host

This is an organism that the parasite lives in and it is harmed by the action of the parasite on or in it's body. For example a human being is a host and plasmodium is a parasite which causes malaria.

(iii) Community

Is a group of different populations of organisms that lives at a specific area. For example frogs and fish in a pond.

(b) Give two examples for each of the following group of parasitic organism:

(i) Endoparasite

Tape worm

Plasmodium.

(ii) Ectoparasite

Ticks.

Lice.

Extract 6.2 is a sample of good response from a student who gave correct responses.

2.2.3 Question 7: Cell Structure and Organization

In this question, students were asked to; (a) define the term "tissue" as used in Biology. In part (b), they were asked to arrange the terms, "tissue, organism, organ, cell and system" sequentially from simple to complex. In part (c) they were asked to outline two differences between plant and animal cells.

The data indicate that 61.31 percent of the students scored from 0 to 2 marks, out of which 48.28 percent scored a 0 mark. The students who scored 3 to 6 marks were 24.18 percent, whereas, 14.51 percent scored 7 to 10 marks as depicted in Figure 7.

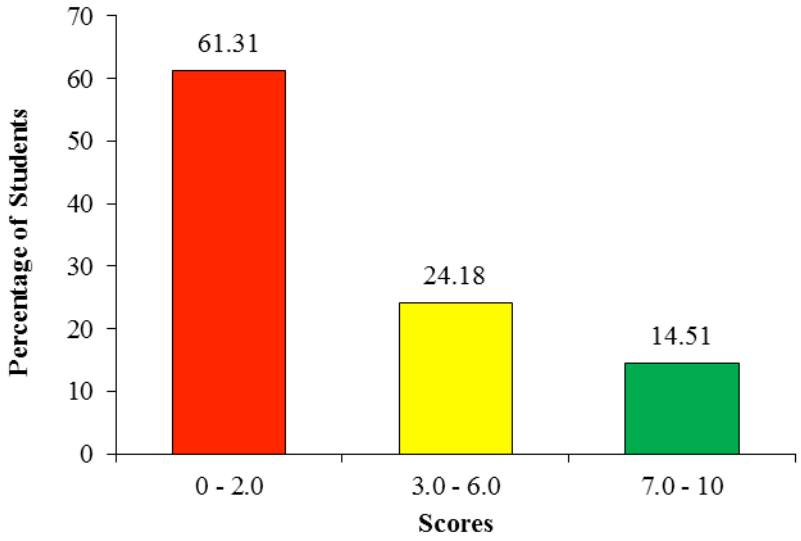


Figure 7: *The student's performance in question 7.*

With reference to the data in Figure 7, the students' performance in this question was average. That is, only 38.69 percent scored 30 marks and above. The majority (61.31%) of the students scored lower marks due to the lack of knowledge on the topic of Cell Structure and Organization. For example in part (a), most of them defined tissue as a process and other defined it as a substance and gave definition as; tissue is *the substance found in an organism*, *is a substance containing many cells, is the process of generate the organ of the body, is a process used to perform the same activities in the body*. In part (b), most of the students failed to present a correct sequence of the given terms from simple to complex. Some of the students gave a reversed order as; *organism*, *system, organ, tissue, cell.* Others copied the order as it was written in the question paper. These responses imply that the students lacked knowledge of the topic of Cell Structure and Organization.

Similarly in part (c), most of the students were unable to outline the differences between plant and animal cells. Irrelevant responses such as *a plant is a cell, does not a organism, plant cell is found in plant only, is not for productive* were observed in the students' scripts. Extract 7.1 exhibits a sample of a student's poor response.

Extract 7.1

7. (a) State the meaning of the term "tissue" as used in Biology.

IS THE PROCESS OF GENERATE THE ORGAN OF THE BODY

(b) Arrange the following terms in a sequential order from simple to complexity of cell differentiation.

Tissue, Organism, Organ, Cell and system.

SYSTEM, TISSUE, CELL, ORGAN AND ORGANISM

(c) Outline two differences between plant cell and animal cell.

S/N	Animal cell	Plant cell
(i)	DOES NOT A CELL	IT IS A CELL
(ii)	IT IS A CELL ORGAN	DOES NOT A ORGANISM

Extract 7.1 shows a sample of a response from a student who lacked knowledge on the topic of cell structure and organization. The student wrote irrelevant responses.

The students who scored good marks in this question had sufficient knowledge of the topic of Cell Structure and Organization. In part (a) these managed to correctly define the term "tissue" as used in Biology. Further in part (b), they arranged the given terms sequentially from simple to complex. Additionally in part (c) they gave clear and correct differences between animal and plant cells. Extract 7.2 shows a sample of a student's good response.

Extract 7.2

7. (a) State the meaning of the term "tissue" as used in Biology.

A tissue is a group of similar cells that are specialized to perform a specific function.

(b) Arrange the following terms in a sequential order from simple to complexity of cell differentiation.

Tissue, Organism, Organ, Cell and system.

Cell, Tissue, Organ, System and Organism.

(c) Outline two differences between plant cell and animal cell.

S/N	Animal cell	Plant cell
(i)	Animal cells don't have chloroplast	Plant cell contain chloroplast.
(ii)	Animal cell don't have cell wall	A Plant cell has cell wall.

Extract 7.2 is a sample of response from a student who precisely defined the term tissue and arranged the terms given in a correct sequence. Also, the student managed to correctly give the differences between plant and animal cells.

2.2.4 Question 8: Nutrition

In this question, the students were provided with a diagram representing a part of the digestive system of a mammal. They were required to: (a) name the parts labelled A, B, C, D, E and F, (b) name two enzymes secreted by the part labelled F and (c), state the role of any one of the enzymes secreted by the part labelled F.

The data indicate that 70.87 percent of the students scored from 0 to 2 marks, out of which 37.55 percent scored 0 mark. The students who scored from 3 to 6 marks were 25.61 percent, whereas, 3.52 percent scored from 7 to 10 marks as depicted in Figure 8.

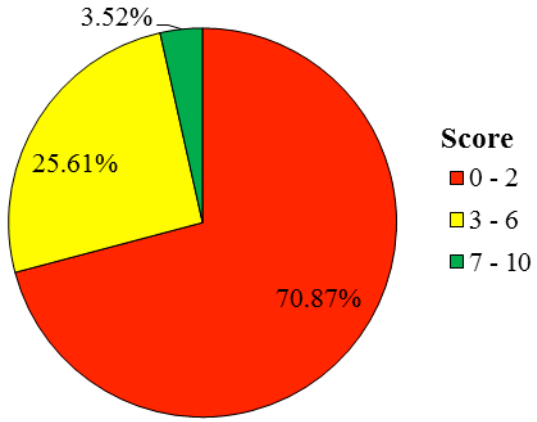


Figure 8: *The students' performance in question 8.*

Figure 8 shows that the students' performance in the question was weak. That is, the majority (70.87%) scored below 3 marks out of the 10 marks allocated to the question. Most of these students failed to give correct answers to almost all items/parts of the question. In part (a), they gave incorrect labels of the parts of the alimentary canal. Examples *A was* labelled as *vacuole, bowel* instead of *duodenum; B* as *tube, stigma* instead of *gall bladder; C* as *cell membrane* instead of *liver, D, as cytoplasm, opening*, instead of *cardiac sphincter muscle E,* as *cell wall* instead of *stomach* and *F* as *pineous leaf* instead of *pancreas.*

In part (b), some students wrote insulin as an enzyme secreted by the part labelled F (pancreas). These students did not understand that although insulin is secreted by the pancreas it is a hormone and not an enzyme. As a result, they wrote the enzyme secreted by part F as *Insulin*. Some students wrote responses which had no relation to the question. Examples of such responses are *cell, tissue, zoology, botany, protein, starch*. These responses imply that the students lacked knowledge of the topic of Nutrition. Extract 8.1 exhibits a sample of a student's poor response.

Extract 8.1

8. **Figure 1 represents a part of the digestive system of a mammal. Study it carefully then, answer the questions that follow:**

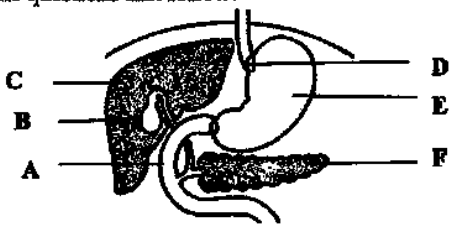


Figure 1

(a) **Name the parts labelled with letters A, B, C, D, E and F.**

A Vacuol

B Stigma

C Cell membrane

D Cytoplasm

E cell wall

F Pineus

(b) **Name two enzymes secreted by the part labelled with letter F.**

(i) Zoology

(ii) Botaney

(c) **State the role of any one of the enzyme secreted by the part labeled F.**

W the group of pineus

Extract 8.1 is a sample of responses from a student who wrote some parts of a cell example cytoplasm as part of alimentary canal. Also, she/he wrote the branches of Biology as the enzymes secreted by the pancreas.

However, despite the weak performance in the question, a few of the students managed to correctly label all parts of the digestive system, and correctly named the enzymes secreted by the pancreas. Additionally, they correctly stated the role performed by the enzyme secreted by the pancreas. Extract 8.2 depicts a student's good response.

Extract 8.2

8. **Figure 1** represents a part of the digestive system of a mammal. Study it carefully then, answer the questions that follow:

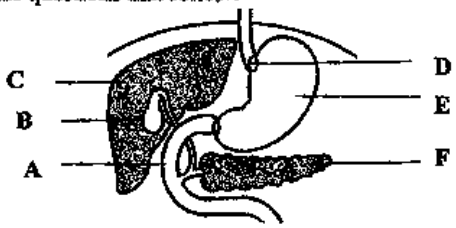


Figure 1

(a) Name the parts labelled with letters **A, B, C, D, E and F.**

A Duodenum

B Gall bladder

C Liver

D Cardiac sphincter

E Stomach

F Pancreaas

(b) Name two enzymes secreted by the part labelled with letter **F.**

(i) Pancreatic lipase

(ii) Pancreatic amylase

(c) State the role of any one of the enzyme secreted by the part labeled **F.**

Pancreatic amylase - It catalyses starch into Maltose

Extract 8.2 shows responses from a student who correctly labelled the parts of the alimentary canal. Also he/she correctly named the two enzyme secreted by the pancreas and state the role of one of it.

2.2.5 Question 9: Gaseous Exchange and Respiration

In part (a) the students were required to mention three structures used for gaseous exchange in land plants. In part (b), they were required to explain the adaptations of a leaf for rapid gaseous exchange and in (c), to name the product of anaerobic respiration in human being muscles.

The data indicate that 96.64 percent of the students scored from 0 to 2.0 marks, out of which 69.96 percent scored 0 mark. The students who scored from 3 to 6 marks were 3.18 percent whereas a few (0.16%) scored from 7 to 10 marks. Figure 9 depicts the performance in the question.

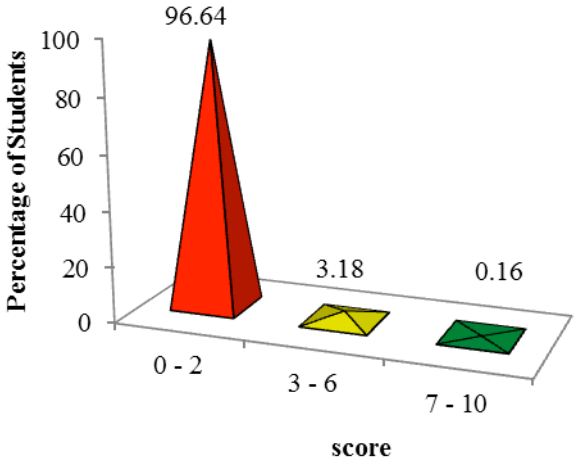
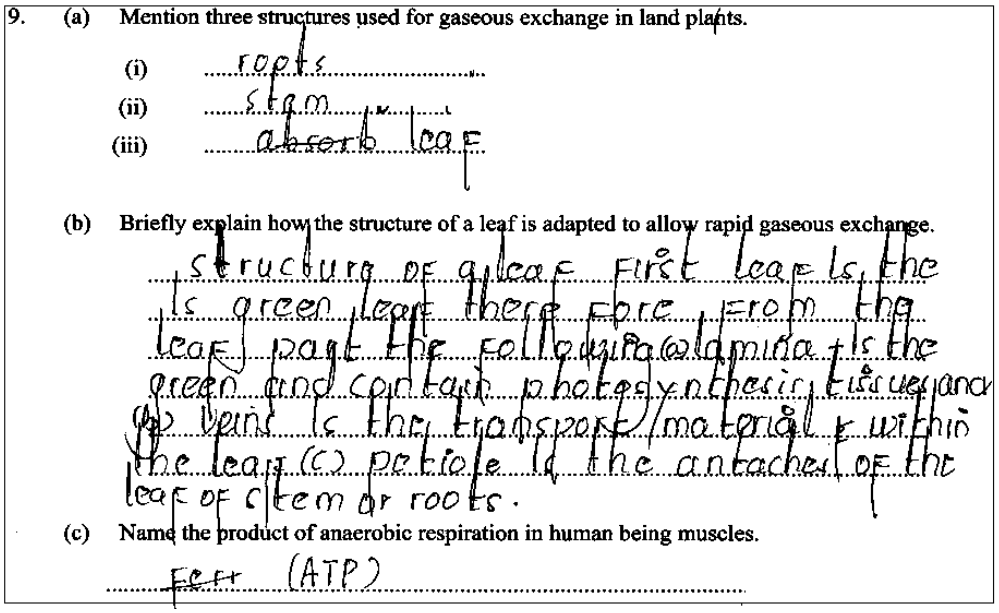


Figure 9: *The students' performance in question 9.*

The students who scored from 0 to 2.0 marks had partial content knowledge of all the structures used by land plants for gaseous exchange. Most of these students identified the structure used by animals for gaseous exchange as *nose, gills, skin, lungs*. Others wrote the parts of a plant such as *leaves, roots, stem*. Moreover, there were students who wrote different gases such as *carbondioxide, hydrogen, oxygen* and others wrote mechanisms of gaseous exchange across the alveoli instead of structures for gaseous exchange in plants.

In part (b), most of the students copied the sentence on how the leaf structure is adapted for gaseous exchange as written in the question paper. Others wrote responses which do not relate to the demand of the question. On the other hand, some students wrote functions of the leaf instead of its adaptations. They gave responses such as *it make food, it undergoes transpiration, it trap light energy for photosynthesis, lamina is green and contain photosynthesis tissue was* observed in the answer sheets. Similarly in part (c), some of the students wrote *energy, heat* and *ATP* as the products of anaerobic respiration in human being muscles. These responses indicate that the students lacked knowledge on the topic of Gaseous Exchange and Respiration. Extract 9.1 displays a sample of a student's poor response.

Extract 9.1


9. (a) Mention three structures used for gaseous exchange in land plants.

(i) roots

(ii) stem

(iii) absorb leaf

(b) Briefly explain how the structure of a leaf is adapted to allow rapid gaseous exchange.

structure of a leaf first leaf is the is green leaf there fore from the leaf part the epidermis is the green and contain photosynthesis tissue and (b) vein is the transport material within the leaf (c) petiole is the anthaches of the leaf of stem or roots.

(c) Name the product of anaerobic respiration in human being muscles.

Fert (ATP)

Extract 9.1 illustrate a sample of responses from a student who lacked knowledge on the topic of Gaseous Exchange and Respiration. In part (a) the student wrote the parts of the plant and in part (b), he/she wrote the words that are related to photosynthesis and transportation of materials.

The students who scored 6 and above marks were able to mention at least two correct structures of gaseous exchange used by land plants. Likewise, they gave clear explanation on how the leaf is adapted for gaseous exchange. In addition, they managed to name the end product of anaerobic respiration. The ability of the students to give correct responses is an indicator that the students had sufficient knowledge of the concept of gaseous exchange and respiration in plants. Extract 9.2 shows a sample of a student's good response.

Extract 9.2

9. (a) Mention three structures used for gaseous exchange in land plants.

(i) Stomata

(ii) Lenticels

(iii) Cuticle

(b) Briefly explain how the structure of a leaf is adapted to allow rapid gaseous exchange.

Has got numerous stomata for gases to enter and leave the leaves rapidly; hence promoting rapid gaseous exchange. Has got large leaf blade or lamina so as to increase surface area for gaseous exchange and carbon dioxide absorption from the atmosphere. Has got the spongy mesophyll that is kept moist and has large sub stomatal air spaces for easy diffusion of gases and hence rapid gaseous exchange.

(c) Name the product of anaerobic respiration in human being muscles.

The product of anaerobic respiration in human being muscles is Lactic acid.

Extract 9.2 shows a sample of good responses from a student who mentioned correct structures for gaseous exchange, explained correctly the adaptations of the leaf and named the product of aerobic respiration in human being muscles.

2.3 Section C: Essay Questions

This section consisted of two questions, but the students were asked to choose and answer only one question.

2.3.1 Question 10: Safety in Our Environment

The question required the students to describe how to provide First Aid to a person who has been "beaten by a snake" and the one who has "fainted at a parade ground".

Data indicate that this question was chosen by 366,016 (75.28%), of the students, whereby 75.54 percent scored from 0 to 5.5 marks. The students who scored from 6 to 12.5 marks were 18.28 percent, while 6.18 scored 13 to 20 marks. The general performance of the students in the question is illustrated in Figure 10.

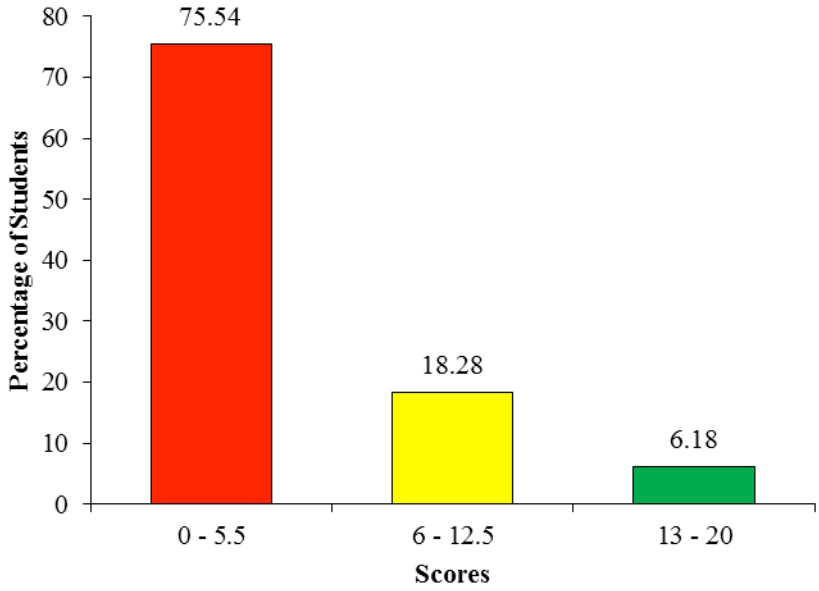


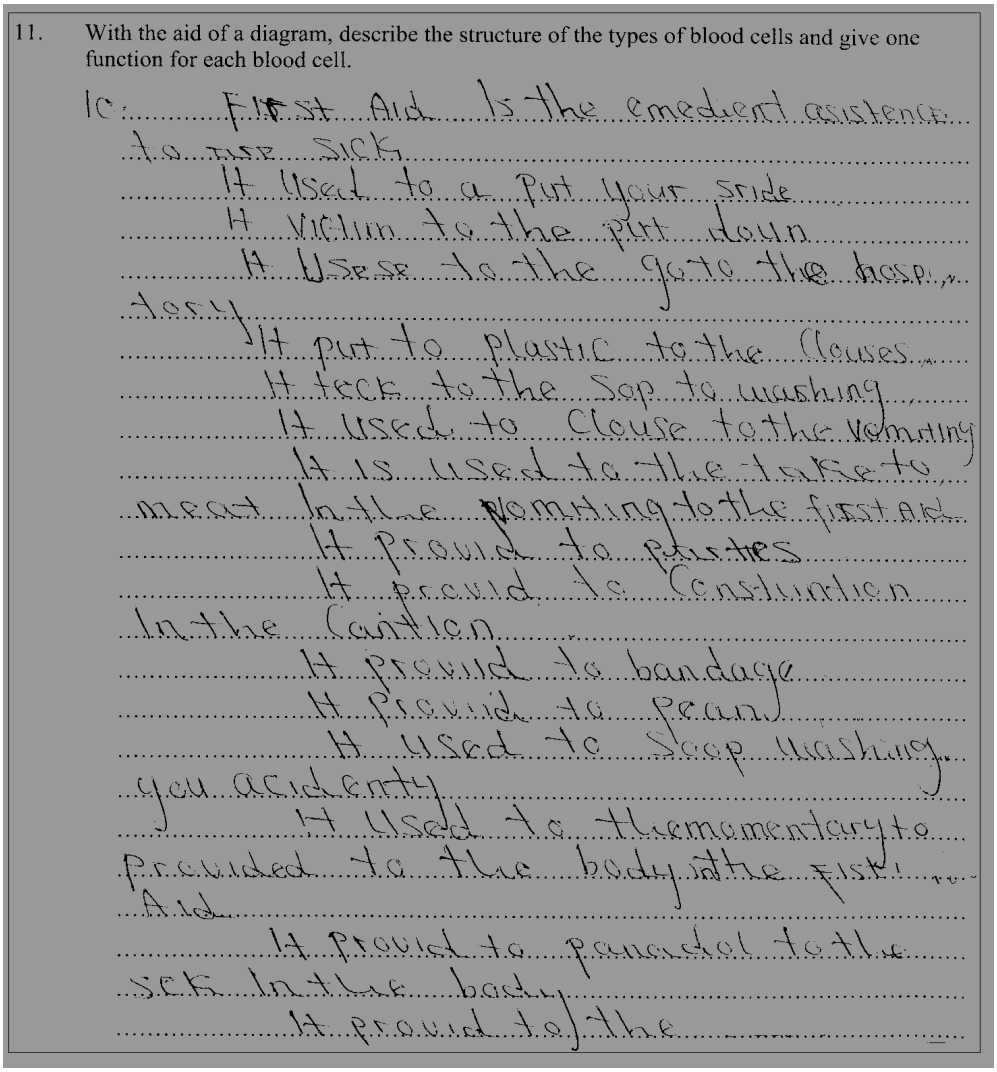
Figure 10: *The students' performance in question 10.*

Figure 10 shows that the majority (75.54%) of the students who attempted the question obtained lower marks. They failed to demonstrate their understanding of how they can give First Aid to a victim of a snake bite. Some of the incorrect responses observed in the students' scripts include; *you can run faster to the hospital if it is near, take medicine and give a person, beat the snake before taking him to the hospital for professional treatment.* On the other hand, some students wrote: *give glucose, power to him cold water, rush to doctor, stop singing song because a parade ground is a place where students arranged in a line and sing a song of the school* as ways to provide First Aid to a person who has fainted at the parade ground.

Moreover, some students simply failed to understand the demand of the question. They for example listed the components of First Aid Kit instead of describing procedures for providing First Aid to the mentioned victims. Some of the First Aid components which were mentioned are *bandage, spirit, pain killer.* Others wrote the advantages of giving First Aid to victims such as *it bring hope, it reduces pain, it prevent from becoming worse, it prevent risk of death.* The responses imply that, student lacked enough practice on the procedures of rendering First Aid to different victims, specifically to a person bitten by a snake or who has fainted at the parade ground.

Additionally, some students demonstrated low proficiency in the English Language as they wrote unclear sentences and misspelt some words while explaining the procedures for rendering First Aid to the victims. Extract 10.1 displays a sample of a student's poor response.

Extract 10.1



11. With the aid of a diagram, describe the structure of the types of blood cells and give one function for each blood cell.

Ic: First Aid Is the emedent assitence to use sick
It Used to a Put your side
H victim to the put down
H Usese to the gete the hosp.
Assy
It put to plastic to the Clouses
H teck to the Sop to washing
It Used to Clouse to the vomiting
It is used to the take to
meat In the vomiting to the first aid
H provid to pastes
H provid to Construction
In the Cantion
H provid to bandage
H Provid to peans
H Used to Soap washing
you accidenty
H Used to the memamentary to
provided to the body in the first
Aid
It provid to pancdol to the
sek In the body
H provid to the

Extract 10.1 reveals a sample of poor responses from a student who wrote irrelevant responses on how to provide First Aid to the victims of snakebite and faint. In addition, she/he had poor English Language proficiency as he/she wrote unclear sentences.

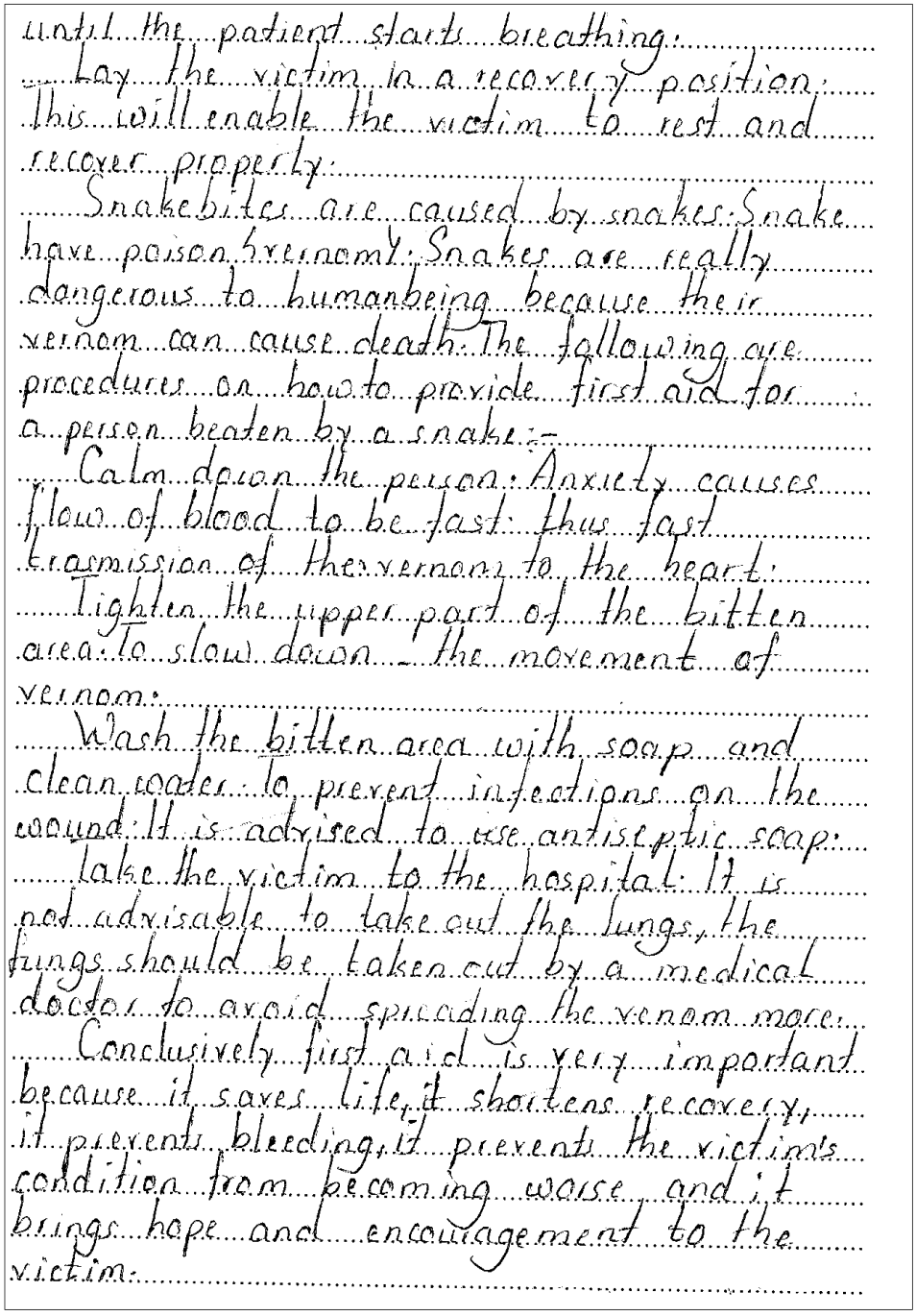
The students who performed well in the question were able to correctly explain some or all procedures of rendering First Aid to victim of snake bite and to a person who has fainted at the parade ground. This implies that they had sufficient knowledge of providing First Aid to various victims, taught in the topic of Safety in our Environment. They also, showed mastery of the English language through their good essays. Extract 10.2 is a sample of a student's good response to the question.

Ext*r*act 10.2

10. Describe how you can provide First Aid to a person who has been "beaten by a snake" and the one who has "fainted during the parade ground".

10. Describe how you can provide first aid to a person who has been "beaten by a snake" and the one who has "fainted during parade ground"
First aid is the immediate help given to an accident victim or a ill person before giving him/her further medical help. Examples of accidents which need first aid are snakebite and fainting. The following are procedures to follow when providing first aid to the victims of the mentioned accidents.
Fainting is caused by lack of oxygen in the brain. The following are procedures to following when proving first aid to a person who has fainted during the parade ground:-
Take the person to a well ventilated place. This will enable the person to get high amount of oxygen.
Loosen the tight clothings around the neck and waist. This allow free movement of blood to all parts of the body.
Lay the patient with the abdomen higher than the head position. This will allow flow of blood to the head.
Check the patient for breathing signs like chest movement. If there are no breathing signs give the patient mouth to mouth ressuscitation

Extract 10.2 (continues)



until the patient starts breathing.
Lay the victim in a recovery position.
This will enable the victim to rest and
recover properly.
Snakebites are caused by snakes. Snake
have poison known as venom. Snakes are really
dangerous to humanbeing because their
venom can cause death. The following are
procedures on how to provide first aid for
a person beaten by a snake:-
Calm down the person. Anxiety causes
flow of blood to be fast thus fast
transmission of the venom to the heart.
Tighten the upper part of the bitten
area to slow down the movement of
venom.
Wash the bitten area with soap and
clean water to prevent infections on the
wound. It is advised to use antiseptic soap.
Take the victim to the hospital. It is
not advisable to take out the fungs, the
fungs should be taken out by a medical
doctor to avoid spreading the venom more.
Conclusively first aid is very important
because it saves life, it shortens recovery,
it prevents bleeding, it prevents the victim's
condition from becoming waise and it
brings hope and encouragement to the
victim.

Extract 10.2 depicts a sample of good responses from a student who managed to describe how to provide First Aid to a person who has been bitten by a snake and the one who has fainted. Also, she/he had good English language proficiency.

2.3.2 Question 11: Transport of Materials in Living Organisms

In this question the students were required to use a diagram to support their description of the structure of the types of blood cells and give one function of each blood cell. The question was optional.

The question was opted by 120,117 (24.71%) students. The data show that 81.08 percent scored from 0 to 5.5 marks. The students who scored 6 to 12.5 marks were 17.23 percent whereas, 1.69 percent scored from 13 to 20 marks. The data are summarized in Figure 11.

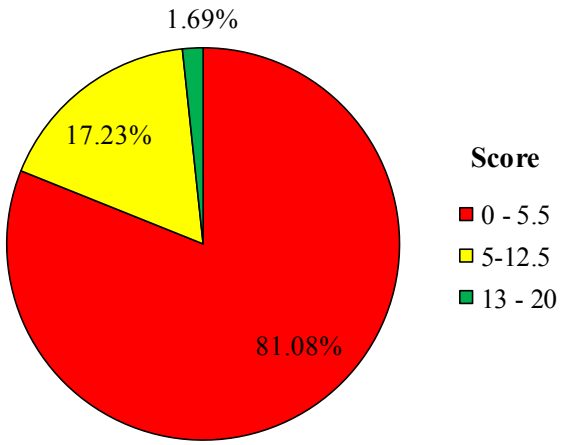


Figure 11: *A summary of students' performance in question 11.*

The trend in Figure 11 reveals that the students' performance was weak. That is, the majority (81.08 %) of the students scored from 0 to 2 out of the total 20 marks allocated to the question. Some of these students failed to understand the demands of the question. For example, they outlined blood group as *group A, B, AB and O* instead of the types and functions of blood cells. Others wrote the functions of blood such as *transport of heat, transport of hormones, transport of nutrients*, while others named the ways of transportation of materials in living things such as *diffusion, osmosis* and *mass flow.*

Other students wrote irrelevant responses such as blood cell *helps lipid, protein, vitamin, oxygen, photosynthesis* instead of the types of blood cells and their functions. Extract 11.1 shows a sample of a student's poor response.

Extract 11.1

11. **With the aid of a diagram, describe the structure of the types of blood cells and give one function for each blood cell.**

(ii) the group of fluid tissue
blood is the group of fluid tissue the following types of Blood cells
(i) osmosis
is the group of mass the following types (ii) mass flow
(iii) is the group of Blood cell the following types (iii) Diffusion
(i) is the Branch of biology which deal with the study of plants
(ii) Vein
(i) is the process of Blood cell the following importances of Blood cell
(i) it help protein
(ii) is the group of vitamin the following importance (ii) it help lipd
(iii) is the group of cell the following importance (iii) it help Vitamin
(iv) is the movement of food the following importance (iv) it help Vena cava
(v) is the movement of blood cell the following importance (v) it help artery
(vi) is the group of Backeria the following importance Conclusion by the structure of the types of blood cells and given one function for each blood cell.

Extract 11.1 illustrates a sample of poor responses from a student who described some ways of transportation of materials in living things such as *osmosis, diffusion* and *mass flow* instead of the types of the blood cells.

The students who scored high marks in the question had adequate knowledge of the topic of Transport of Materials in Living Things. The students also demonstrated good command of English Language, good drawing skill and essay writing. Extract 11.2 is a sample a student's good response in the question.

Extract 11.2

11. **With the aid of a diagram, describe the structure of the types of blood cells and give one function for each blood cell.**

11:

Blood is a specialized tissue which consists of blood plasma and blood cells such as white blood cell, red blood cells and blood platelets. There are different organisms such as Warm blooded animals and cold blooded animals. Blood is a very essential fluid in animals because it perforns a variety of functions. These functions are specifically performed by specialized blood cells. The following are types of blood cells and their function in the living organism:

White blood cells; these are cells which have irregular shape because of the functions they perform. White blood cells are made in the bone marrow of long bones. They are two main types of Leucocytes these are Phagocytes and lymphocytes. White blood cells have a nucleus in their cell and they have amoebic movement. Phagocytes attack and surrounds the pathogen in the living organism and digest it.

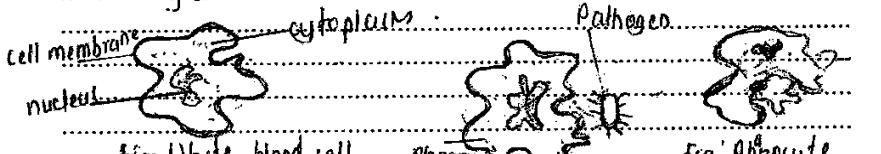
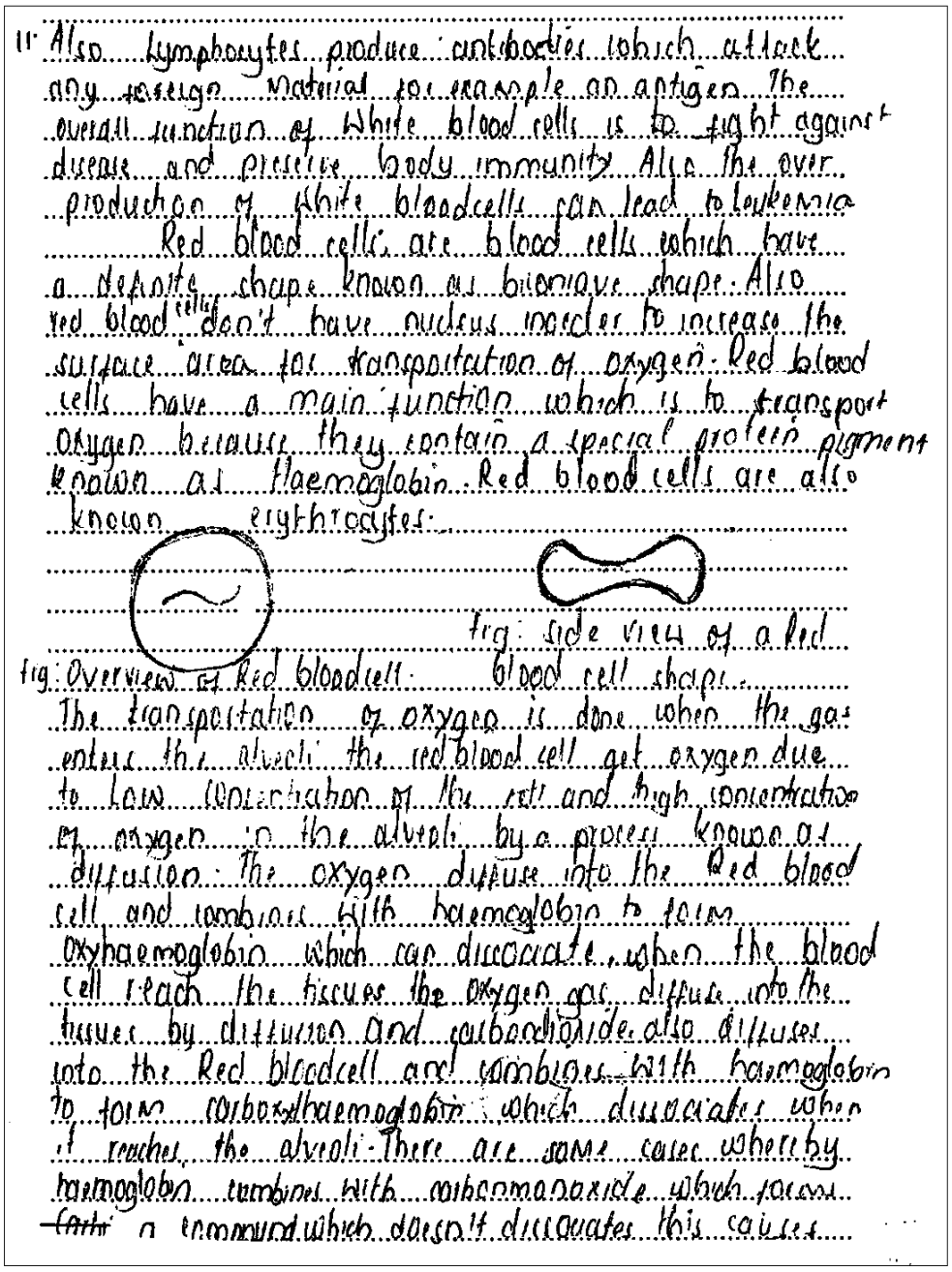


Fig: White blood cell with irregular shape

Fig: Phagocyte surrounding the Pathogen

Fig: Phagocyte engulfing the Pathogen inorder to digest it

Extract 11.2 (Continues)



11 Also lymphocytes produce antibodies which attack any foreign material for example an antigen. The overall function of White blood cells is to fight against disease and preserve body immunity. Also the over production of White blood cells can lead to leukemia.
Red blood cells are blood cells which have a definite shape known as biconcave shape. Also red blood cells don't have nucleus inorder to increase the surface area for transportation of oxygen. Red blood cells have a main function which is to transport oxygen because they contain a special protein pigment known as Haemoglobin. Red blood cells are also known as erythrocytes.

fig: Overview of Red blood cell

fig: side view of a Red blood cell shape

The transportation of oxygen is done when the gas enters the alveoli the red blood cell get oxygen due to low concentration of the cell and high concentration of oxygen in the alveoli by a process known as diffusion. The oxygen diffuse into the Red blood cell and combines with haemoglobin to form oxyhaemoglobin which can dissociate, when the blood cell reach the tissues the oxygen gas diffuse into the tissues by diffusion and carbondioxide also diffuses into the Red blood cell and combines with haemoglobin to form carboxyhaemoglobin which dissociates when it reaches the alveoli. There are some cases whereby haemoglobin combines with carbonmonoxide which forms ~~forti~~ a compound which doesn't dissociates this causes

Extract 11.2 (Continues)

insufficient supply of oxygen.

Insufficient supply of Red blood cells can cause Anaemia or sickle cell anaemia which is a fatal disease.

Blood platelets; they are also known as thrombocytes. These are fragments of cells which look like star shaped. Blood platelets helps mainly in blood clotting and this acts as its main function.

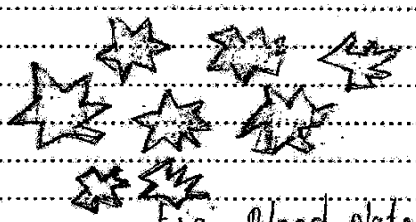


Fig. Blood platelets as seen under Microscope.

The process of blood clotting is as follows: when a person gets injured and blood is exposed to air the thromboplastin (chemical found in blood platelets) is released, this chemical combine with Potassium and Calcium and they change heparin (anticoagulant in blood) to its inactive form. Heparin changes Prothrombin into its active form thrombin, where this components changes fibrinogen (inactive form) into fibrin which is an insoluble fibre which forms an network of fibre (mechanic) which traps debris and blood cells and hence causes them to clot. Lack of blood platelets leads to inability of blood to clot which is scientifically referred to as Haemophilia which causes excessive bleeding known as Haemorrhage which is very fatal once one loses clot of blood which can lead to instant death.

Conclusively blood cells are very important to our life being because Lack of any of them can lead to diseases such as Anaemia, Leukaemia, sickle cell anaemia; therefore we should eat food which enhance the formation of blood cells for example food rich in Iron which helps in manufacturing red blood cells

Extract 11.2 illustrates a sample of good responses from a student who had sufficient knowledge on Transport of Materials in Living Things. He/she correctly described the structures of blood cells and gave one function for each type of blood cell. The student also demonstrated good skills in drawing.

3.0 ANALYSIS OF THE STUDENTS' PERFORMANCE PER TOPIC

The analysis of the students' performance topic-wise shows that out of the 9 topics that were assessed in the Biology FTNA 2017 the highest performance of 95.68 percent was noted in question 2 which was comprised of True and False Items derived from the topics of Introduction to Biology, Gaseous Exchange and Respiration, Nutrition, Safety in Our Environment, Balance of Nature, Health and Immunity and Classification of Living Things. The second highest performance was observed in question (1) (86.36%) which consisted of multiple choice items derived from the topics of Classification of Living Things, Balance of Nature, Transport of Materials in Living things, Nutrition, Gaseous Exchange and Respiration, Cell structure and Organization, Health and Immunity and Safety in Our Environment. This was followed by the topic of Health and Immunity with the performance of 71.28 percent.

The topics which had average performance were Introduction to Biology (45.41%); Classification of Living Things (39.45%) and Cell Structure and Organization (38.69%).

The topics with weak performance were Balance of Nature (13.21%), Gaseous Exchange and Respiration (17.29%), Transport of Materials in Living Things (18.92%), Safety in Our Environment (24.46%) and Nutrition (29.13%). Appendix 1 presents a summary of students' performance in the FTNA 2017, whereby weak performance is represented by red colour, average by yellow colour and good by green colour with the percentage of the students who scored from 30% or above of the marks allocated to the question ranging from 0 - 29%, 30 - 64% and 65 - 100% respectively.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

This analysis of the students' responses reveals a number of factors that may have affected performance. The factors are such as:

(a) Failure to understand question demands. It appeared that students rushed to attempt questions before reading them carefully.

(b) Lack of knowledge on the topics tested may have also caused the weak performance. It seems that students do not revise all FI and FII topics before the commencement of FTNA assessment.

(c) Inadequate knowledge of application of scientific knowledge and procedure has also affected the performance. This may have been caused by the lack of classroom assessment that could enable teachers to identify students' learning weaknesses. They likely did not get feedback that could have enlightened them on how to improve their learning before the FTNA assessment.

(d) Poor command of the English Language also caused students to fail to express their responses clearly.

4.2 Recommendations

On the basis of these findings from Students Item Response Analysis (SIRA), the following recommendations are presented so as to further improve performance in Biology subject:

(a) Students are urged to read question(s) carefully before answering them. This will enable them to understand the requirement of questions.

(b) Teachers are advised to continue to apply various teaching methods to make sure that students learn in an inquiry oriented way. They should strive to instil deep understanding of content matter to students.

(c) Teachers are advised to assess students' achievements on daily basis so that they can give them timely feedback. Weaknesses shown by students during tests will enable teachers to improve teaching. The students can also use the feedback to improve their learning before sitting for FTNA.

(d) Teachers should involve students in activities such as debate, reading novels and speaking English most of the time to help them improve proficiency in the English language.

Appendix

Students' Performance Topic – wise in FTNA – 2017

S/N	Topic	FTNA 2017		
		Question Number	Percentage of Students who Scored from 30% and above	Remarks
1	**True and False Items;** (Introduction to Biology, Gaseous Exchange and Respiration, Nutrition, Safety in Our Environment, Balance of Nature, Health and Immunity and Classification of Living Things).	2	95.68	Good
2	Multiple Choice Items (Classification of Living Things, Balance of Nature, Transport of Materials in Living Things, Nutrition, Gaseous Exchange and Respiration, Cell Structure And Organization, Health And Immunity and Safety in Our Environment).	1	86.36	Good
3	Health and Immunity	3	71.28	Good
4	Introduction to Biology	5	45.41	Average
5	Classification of Living Things	4	39.45	Average
6	Cell Structure and Organization	7	38.69	Average
7	Nutrition	8	29.13	Weak
8	Safety in our Environment	10	24.46	Weak
9	Transport of Materials in Living Things	11	18.92	Weak
10	Gaseous Exchange and Respiration	9	17.29	Weak
11	Balance of Nature	6	13.21	Weak